

## Exemplary Responses and Examples of Common Errors found on the Performance-Based Section of the Secondary-Level Science MAP Assessment

The performance-based event session of the MAP Assessment is focused on understandings of experimental design and inquiry. The secondary level assessment expects students to be able to design experiments, analyze and evaluate experimental design, and analyze the results and conclusions drawn from experiments involving multiple independent variables. In order to improve student achievement on the MAP assessment, teachers are encouraged to:

- use the Science Performance Event Template (which includes standardized prompts and scoring guides) to inform classroom instruction and assessment practices,
- use assessment released items and corresponding anchor papers to become familiar with test item format and expectations,
- align instruction and assessment with the Science Grade-Level Expectations and supporting documents, and
- regularly involve students in learning experiences that incorporate inquiry methods.

Students and Research, authored by Cothran, J. H., Giese, R. N., and Rezba, R. J. (2000, Dubuque, IA: Kendall/Hunt Publishing), is recommended as an excellent resource for use as teachers develop understandings of open-inquiry and experimental design.

This document is designed to provide clarification of expectations for selected key elements of experimental design regularly assessed on the Science MAP assessment. The standardized prompt and scoring guides are provided, along with examples of common errors and anchor papers (examples of student work with scoring annotations). Teachers are encouraged to share and adopt these standards across classrooms and to expect mastery of inquiry skills by all students.

Each MAP Performance-based event is developed as a module of questions focusing on a specific experimental scenario. A review of standardized prompts and scoring guides, with common errors, for selected Performance event module items is provided. These are followed by samples of modules with examples of student responses.

## **Using Released Items with Colleagues and Students**

### **#1 To familiarize students/teachers with the format and expectations of the performance-event component of the MAP test**

A booklet of released items can be used as a “package” to give students/teachers an overview of the test as a whole, so they can see the variety of questioning strategies used. In Science and Communication Arts in particular, items are linked and students need to learn how to refer back to stimulus material or the initial prompt.

### **#2 To train students in self-evaluation and proofreading**

Teachers should use the released items for the performance events (for example, the word problem in Mathematics, the writing prompt in Communication Arts, the experimental design module in Science) and respective anchor papers to train students how to use the prompt and scoring guides to evaluate their own work and the work of other students. This is a very important step in improving student achievement. The following is a recommended process.

- a. Use post-it notes to cover the annotations and scores on the student anchor papers; then make transparencies of the problem (item prompt), the scoring guides, and the student anchor papers. Make paper copies of the problem and the scoring guide for student use.
- b. Distribute paper copies of the problem for students to work individually.
- c. Distribute copies of the scoring guide and review it with the class.
- d. Have students use the scoring guide to determine a score for their own paper (privately). If they think they have made a mistake, have them articulate the mistake on the paper or on a post-it note. The students’ own annotated papers should be set aside.
- e. Put up a transparency of one of the anchor papers. Be sure the score and annotations are not visible. Have students work in pairs to score the sample work. Remind them that they need to refer to the scoring guide and stay true to its expectations.
- f. As a class, discuss the scores assigned to the work by the students. Students must be able to defend the scores they gave based on the scoring guide.
- g. Repeat this process with the rest of the samples.
- h. Have students return to their own work and decide if the score they initially gave their response needs to be revised.
- i. Students should be able to articulate what changes need to be made in their work in order to earn credit for an exemplary response.

### **#3 To establish standardized expectations for students across classrooms**

Teachers should experience the procedure described above using a packet of released items, scoring guides, and anchor papers. After completion of steps a – g, teachers should use MAP-like scoring guides to blind-score sets of students’ work. After participating teachers have scored the set of papers, they should compare assigned scores. Discrepancies indicate the need to standardize expectations from one class to the next and/or to adopt MAP-like test formats, prompts and scoring guides for regular classroom use. Analysis of student scores may indicate the need to revise curriculum and assessments to better prepare students for mastery of expectations.

## Sample Performance-based Event Scenario A

The high school science club decided to raise flowers as a fundraiser. The flowers had to be healthy in order to compete with those sold at the local greenhouse. The students decided to investigate which substance, water, light, or fertilizer, would have the greatest effect on plant growth.

- A. Write a question that could be the basis of their investigation.

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- B. What is the hypothesis for this investigation?

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- C. Identify the independent and dependent variable in the experiment.

Independent Variable: \_\_\_\_\_

Dependent Variable: \_\_\_\_\_

- D. Describe at least three essential steps in the procedure needed to conduct your new valid experiment about speeding up plant growth. The procedure must be written so that students in another science class could clearly follow your instructions and successfully complete the experiment.

1. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_

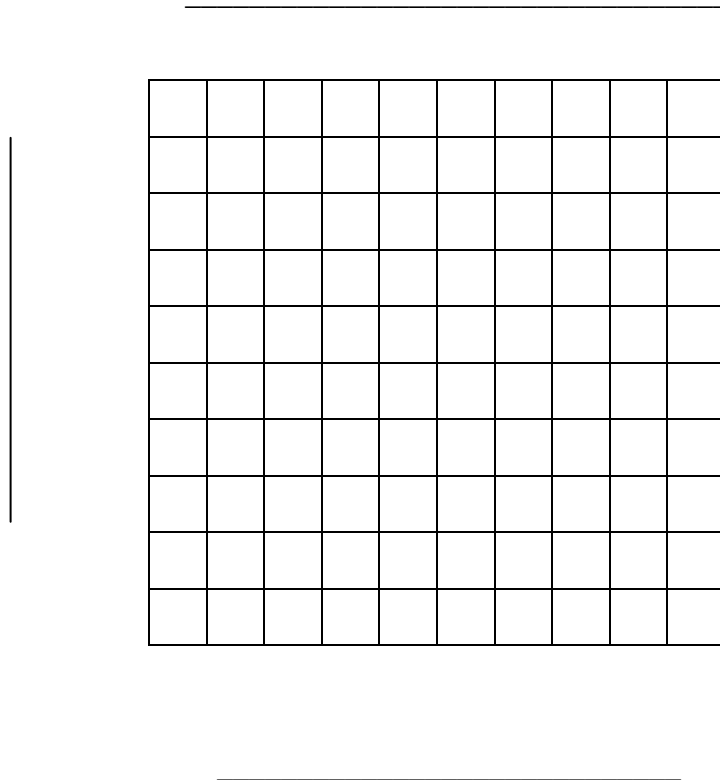
\_\_\_\_\_

\_\_\_\_\_

- E. Construct a data table in the space below that other students could use to record and analyze the data collected during the new experiment related to speeding up plant growth. Be sure to label rows and columns appropriately and to include units if necessary.

- F. Use all data from the data table to construct a multi-line graph on the grid below.  
Be sure to provide:

- an appropriate title
- labeled axes with appropriate units
- appropriate number scales
- correctly plotted data with a key



## Scenario B:

Scientists must select one bacterium for production in large quantities for a local drug company as quickly as possible. They know that there are two new strains, A and B, of the bacteria. Bacteria can be grown using either starch or nutrient agar as a growth medium. However, only some bacteria digest the starch.

- A. Write a question that could be the basis of their investigation

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- B. What is the hypothesis for this investigation?

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- C. Identify three factors that must be held constant during the experiment.

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- D. Construct a data table in the space below that other students could use to record and analyze the data collected during the new experiment related to growing colonies of bacteria. Be sure to label rows and columns appropriately and to include units if necessary.

## Sample Performance-based Event Scenario A

The high school science club decided to raise flowers as a fundraiser. The flowers had to be healthy in order to compete with those sold at the local greenhouse. The students decided to investigate which substance, water, light, or fertilizer, would have the greatest effect on plant growth.

### Generic Scoring Guide for Testable Questions

#### Testable Question:

Any reasonable testable question about \_\_\_\_ that:

- identifies what will be tested or measured
- will generate quantifiable data
- has a control or comparison inherent in the question

(Scoring note: Statements of a problem that meet the criteria for a testable question will be allowed)

#### Common errors

- Response does not identify what is to be tested or measured (e.g., affect of independent variable on dependent variable)
- Response does not identify what quantifiable data will be collected
- Suggests an vague change instead of a specific, measurable change in the dependent variable (e.g., “what will happen if the (IV) is changed?” does not identify a measurable dependent variable)
- Response does not suggest a comparison between the control and experimental group(s)
- Response does not suggest a problem (instead may be a prediction)
- Problem is vague due to use of pronouns (it, they) instead of using specific nouns to identify the independent variable and dependent variable

#### A. Write a question that could be the basis of their investigation

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#### Point Assigned:

*Exemplary:* What is the effect of water on plant growth?

*Acceptable:* To test the effect of water on the growth of plants.

#### No Point Assigned:

*Subjective:* To test why plants grow better with water

*Vague:* To test the growth of plants under different conditions.

### Generic Scoring Guide for Testable Hypotheses

#### Testable Hypothesis:

Any reasonable hypothesis based on the testable question or statement of a problem that predicts an effect, or the lack of effect, of the independent variable on the dependent variable

Exemplary responses take these appropriate forms:

“If (independent variable) (description of change in independent variable), then (dependent variable) (description of effect)”

“As the (independent variable) (description of change)s, the (dependent variable) (description of observed changes in dependent variable)s”

“The (qualitative/quantitative change in independent variable) of (independent variable), the (quantitative change in dependent variable)”

#### Common errors

- Response does not provide a specific, directional prediction (e.g., prediction fails to identify how the dependent variable will be affected by the independent variable; prediction is vague as it does not specify how the change will differ from the expected results to be observed in the control group)
- Response does not suggest a specific, quantifiable change in the dependent variable (e.g., predicts a “better/best” effect which does not suggest “how” the effect would be better; predicts that the independent variable will “affect/help/change \_(DV)\_ more/the most,” which does not specify what will be changed and/or how)
- Prediction does not relate to problem or question asked (e.g., may predict a change in a dependent variable different from the change specified in the problem)
- Provides a reason for change instead of a prediction of change
- Prediction is vague due to use of pronouns (it, they) instead of using specific nouns to distinguish between the independent variable and dependent variable
- Provides another question or statement of the problem instead of a hypothesis

#### B. What is the hypothesis for this investigation?

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#### Point Assigned:

*Positive:* If plants are supplied with water then they will grow taller than plants that are not watered.



*Null:* If plants are supplied with water then they will grow no taller than plants that are denied water.

**No Point Assigned:**

*Non-related:*

- The number of plant leaves will increase as the plant grows
- Sunlight and water help plants grow

*Insufficient:*

- Plants grow everyday
- Water can be added to plants

*Incorrect:*

- Water as a fertilizer will make plants grow taller
- Plant growth increases as the amount of water increases

### Identifying Independent and Dependent Variables

A hypothesis with only a prediction of main effect should be tested by an experiment in which only one variable is changed at a time. All other variables should be kept unchanged, or controlled.

(A hypothesis suggesting that two, or more, factors may interact to influence the results of an experiment, is tested by an experiment having two, or more, independent variables. The results of experiments with multiple independent variables are appropriately displayed on a multi-line graph.)

Students are expected to be able to distinguish among the following elements of a properly designed experiment:

- a. The variable that is purposely manipulated (changed) by the experimenter is called the **independent variable**. The independent variable is the factor believed to cause a change in the dependent variable.
- b. The variable that changes in response to the independent variable and is observed (collected as data) is called the **dependent variable**.
- c. **Constants** are all factors that remain the same and have a fixed value. Their purpose is to isolate the factor (independent variable) that can affect the results.
- d. The **control** (or control group) is the standard for comparing experimental results. This experimental setup (group) either does not contain the independent variable or provides a baseline value for the independent variable.

#### Common errors

- Independent and Dependent variables are reversed.
- Responses indicate that students do not understand the definitions and purposes of the different elements of the experiment and cannot distinguish between them.
- Students cannot identify all independent variables when analyzing an investigation involving the interaction of more than one independent variable, instead of the main effect of just a single independent variable

#### C. Identify the independent and dependent variable in the experiment.

**Independent Variable:** \_\_\_\_\_ Water \_\_\_\_\_

**Dependent Variable:** \_\_\_\_\_ Growth of the Plant \_\_\_\_\_

**Generic Scoring Guide for Writing an EXPERIMENTAL PROCEDURE, Grade 11**

**Three Total Points**

**One point for each of the following:**

- Point 1:** Procedure provides a qualitative outline that includes **3 or more steps** that are logical and appropriate for **answering the question**.
- Point 2:** Procedure provides enough **specific, quantitative, and appropriate information** that a knowledgeable person could conduct the experiment and obtain the same results.
- Point 3:** Procedure indicates an understanding that the **independent variable changed**, the **effect on the dependent variable is observed**, and the **need to hold all other factors constant**

**Prompt reads:**

**Describe at least three essential steps in the procedure needed to conduct your new valid experiment related to (reference to new experiment). The procedure must be written so that students in another science class could clearly follow your instructions and successfully complete the experiment.**

- D. Describe at least three essential steps in the procedure needed to conduct your new valid experiment about speeding up plant growth. The procedure must be written so that students in another science class could clearly follow your instructions and successfully complete the experiment.**

1. Set up two plants of the same type and 25 cm in height where both soil type and the amount of sunlight each plant receives daily are the same.
2. Provide 100ml of water to one of the plants daily and do not water the other plant. Continue this process for ten (10) days.
3. Measure the starting height of each plant and continue to measure their respective heights each day of the experiment. A table should be set up in which to record the data.

## Generic Scoring Guide for DATA TABLES, Grade 11

### Two Total Points

#### One point for each of the following:

##### **Point 1:**

The **row or column headings indicate what information is to be manipulated and recorded relative to the independent variable** (can be a descriptive heading **with units, if necessary**, or the conditions to be varied may be written in)

**AND**

The **row or column headings indicate what information is to be observed and recorded relative to the dependent variable** (can be a descriptive heading **with units, if necessary**, or the conditions to be varied may be written in)

##### **Point 2:**

Data table is **organized to allow for collection and analysis of data relevant to the experiment**

#### Prompt reads:

**Construct a data table in the space below that other students could use to record and analyze the data collected during the new experiment related to** (reference to new testable hypothesis). **Be sure to label rows and columns appropriately and to include units if necessary.**

Ideally, the experimenter should be able to identify the main elements of an experiment in the data table, without reference to the prompt. These elements include: the independent variable, values of the independent variable to be tested, the kind of results (data related to the dependent variable) to be observed, the number of trials or measurements to be recorded, and the units of measure, simply by reading the information found in the data table. It should allow for easy comparison of results for the different values of the independent variable.

#### Common Errors:

- Headings do not indicate what type of data is to be recorded (e.g., temperature, distance, height)
- Units are not provided for measurements (either in the row or column headings or in the spaces provided for the values of the independent/dependent variables)

- Sufficient rows or columns are not provided for recording data specific to the independent variable values or number of trials/measurements identified in the description of the experiment
- Graphs are created instead of data tables
- Rows and columns are not arranged so that the results for the different values of the independent variable can be easily compared (e.g., data for each value is recorded in a separate table; each trial or measurement is recorded in a separate table)

**E. Construct a data table in the space below that other students could use to record and analyze the data collected during the new experiment related to speeding up plant growth. Be sure to label rows and columns appropriately and to include units if necessary.**

**2 Points Earned:**

**Exemplary responses:**

**How water affects Plant Growth**

Day	Height of Plant w / water	Height of Plant w /o water
0	cm	cm
1	cm	cm
2	cm	cm
3	cm	cm
4	cm	cm
5	cm	cm
6	cm	cm
7	cm	cm
8	cm	cm
9	cm	cm
10	cm	cm

**The effect of water on Height of Plant**

	Height of Plant (cm)									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Plant with water										
Plant Without Water										

**2 points earned:**

**Table w/o Title**

(Table still identifies the independent variables, data to be observed, number of measurements to be taken, units of measure)

Day	Height of Plant w / water	Height of Plant w /o water
0	cm	cm
1	cm	cm
2	cm	cm
3	cm	cm
4	cm	cm
5	cm	cm
6	cm	cm
7	cm	cm
8	cm	cm
9	cm	cm
10	cm	cm

**One point earned:** (Table does not identify units of measure)

Plant Growth

Day	Height of Plant w / water	Height of Plant w /o water
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

***O points earned:***

***Table w/o labeling of columns***

(Unable to identify what variables are represented or data is to be collected)

Plant Growth		
0	cm	cm
1	cm	cm
2	cm	cm
3	cm	cm
4	cm	cm
5	cm	cm
6	cm	cm
7	cm	cm
8	cm	cm
9	cm	cm
10	cm	cm

***O points earned:***

***Data represented in some form other than a table (such as a graph)***

(sample not required)

### **Generic Scoring Guide for Multi-Line GRAPH, Grade 11**

(10x10 grid provided with spaces for labeling of axes and title)

#### **Four Total Points**

#### **One point for each of the following:**

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Both axes correctly labeled (horizontal axis labeled with independent variable, vertical axis labeled with dependent variable), with units** if appropriate
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled
- **All data points correctly plotted and connected by lines AND with an appropriate key to identify each line**

#### **Prompt reads:**

**Use all data from the data table to construct a multi-line graph on the grid below.**

#### **Be sure to provide:**

- **an appropriate title**
- **labeled axes with appropriate units**
- **appropriate number scales**
- **correctly plotted data with a key**

#### **Common errors on Line Graph**

- Title provided is a “catchy name” instead of a description of the intent of the experiment (e.g., “(IV) compared to (DV),” “The effect of (IV) on (DV)”)
- Axes are not labeled with variable descriptions
- Axes are reversed (i.e., independent variable is plotted along y-axis instead of x-axis; dependent variable is plotted along x-axis instead of y-axis)
- Units of measure are not provided
- No points or only some of the points are plotted correctly; a single line of data is plotted for only one of the independent variables instead of both lines of data
- Points are not connected by a line
- A key (or legend) is not provided for the two graph lines
- Key (or lines) are reversed so that the key does not match the points plotted
- Bars are plotted instead of points connected by a line
- Numbering of axes
  - is not consistently scaled
  - are not equally spaced
  - values do not allow for plotting of data
  - are not aligned with grid lines (e.g., written between lines so that value of line cannot be distinguished)

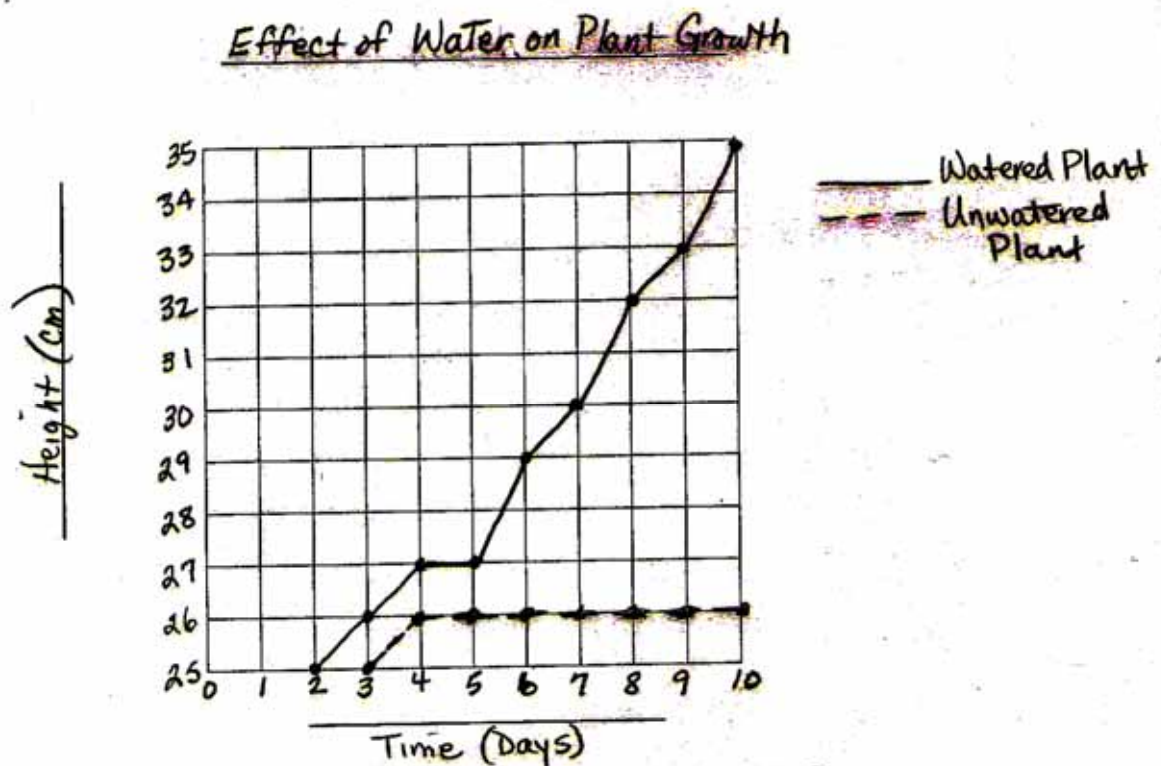


## ANCHOR PAPERS:

*Exemplary:*

**4 Points Earned**

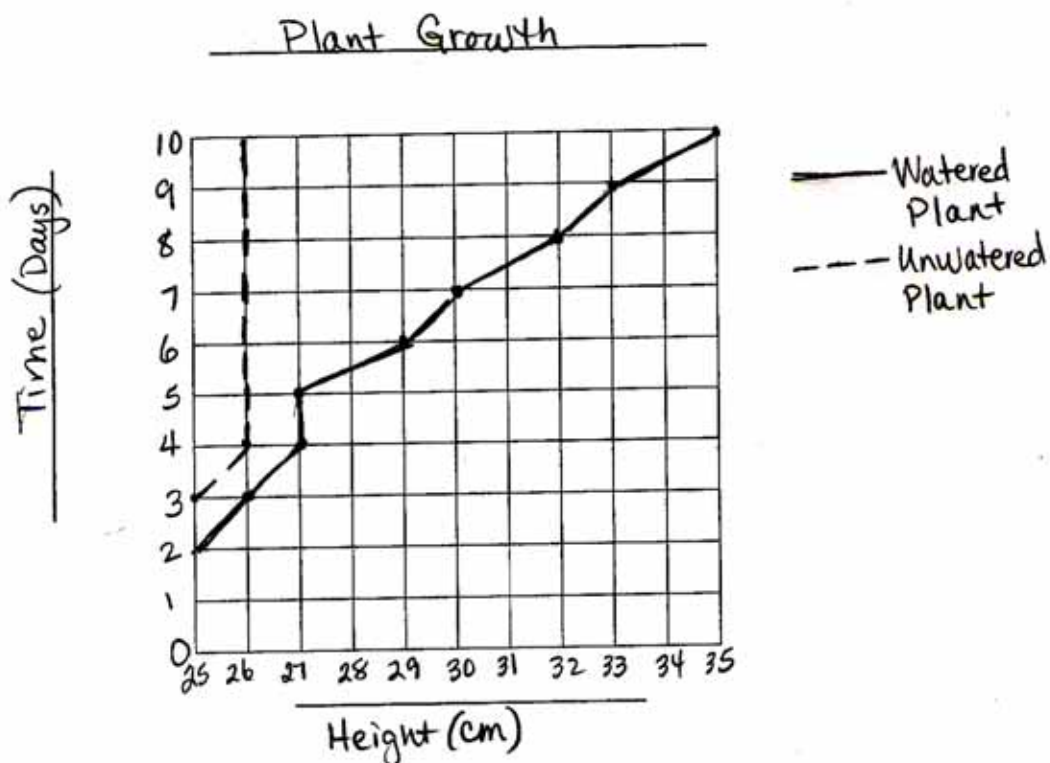
- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Both axes correctly labeled (horizontal axis labeled with independent variable, vertical axis labeled with dependent variable), with units if appropriate**
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled
- **All data points correctly plotted and connected by lines AND with an appropriate key to identify each line**



### 3 Points Earned

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled
- **All data points correctly plotted and connected by lines AND with an appropriate key to identify each line**

(Axes are reversed)

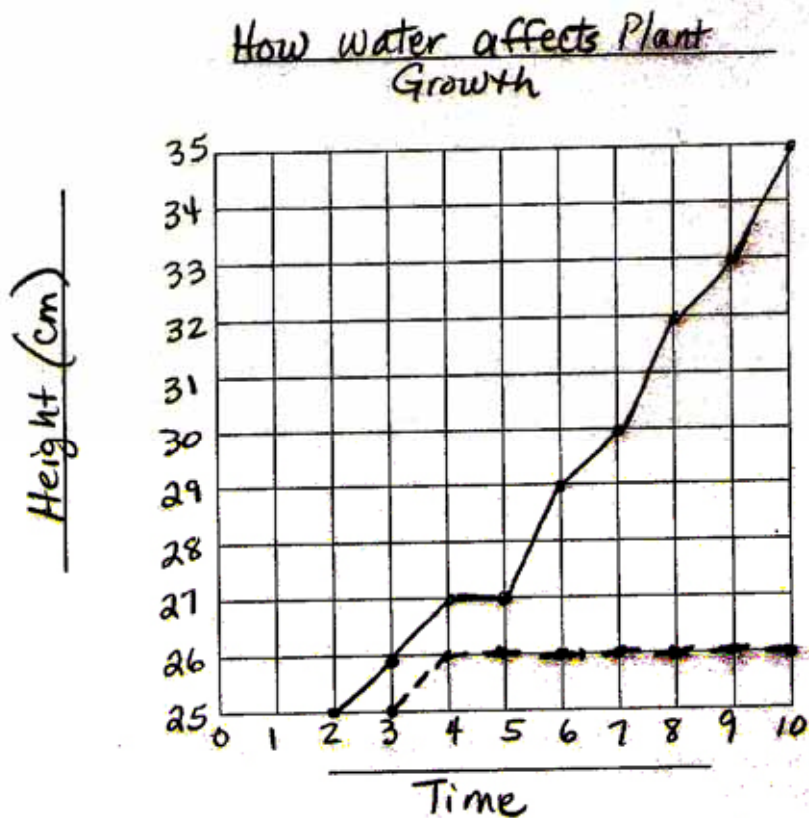


**2 Points Earned**

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled

(No unit of measure for time is provided

No key is provided to identify variable represented by each line)



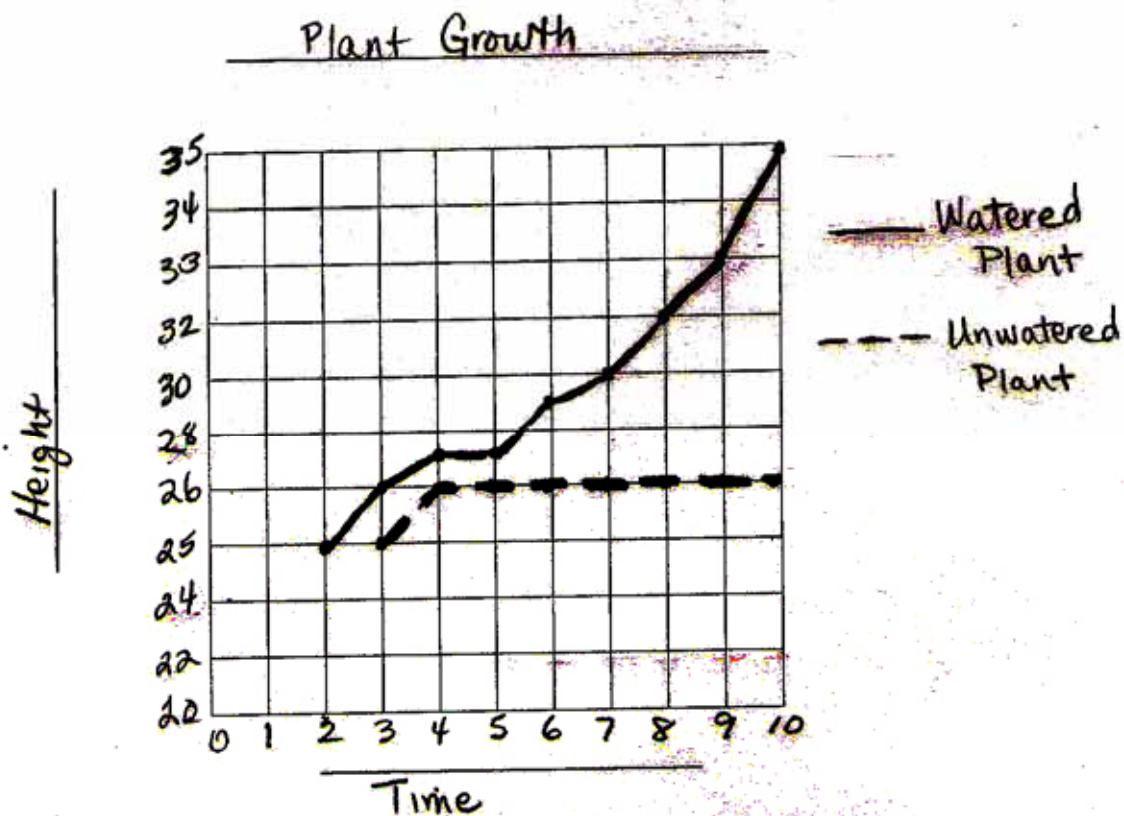
**1 Point Earned**

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested

(no units of measure provided)

Inconsistent scaling of units along y-axis

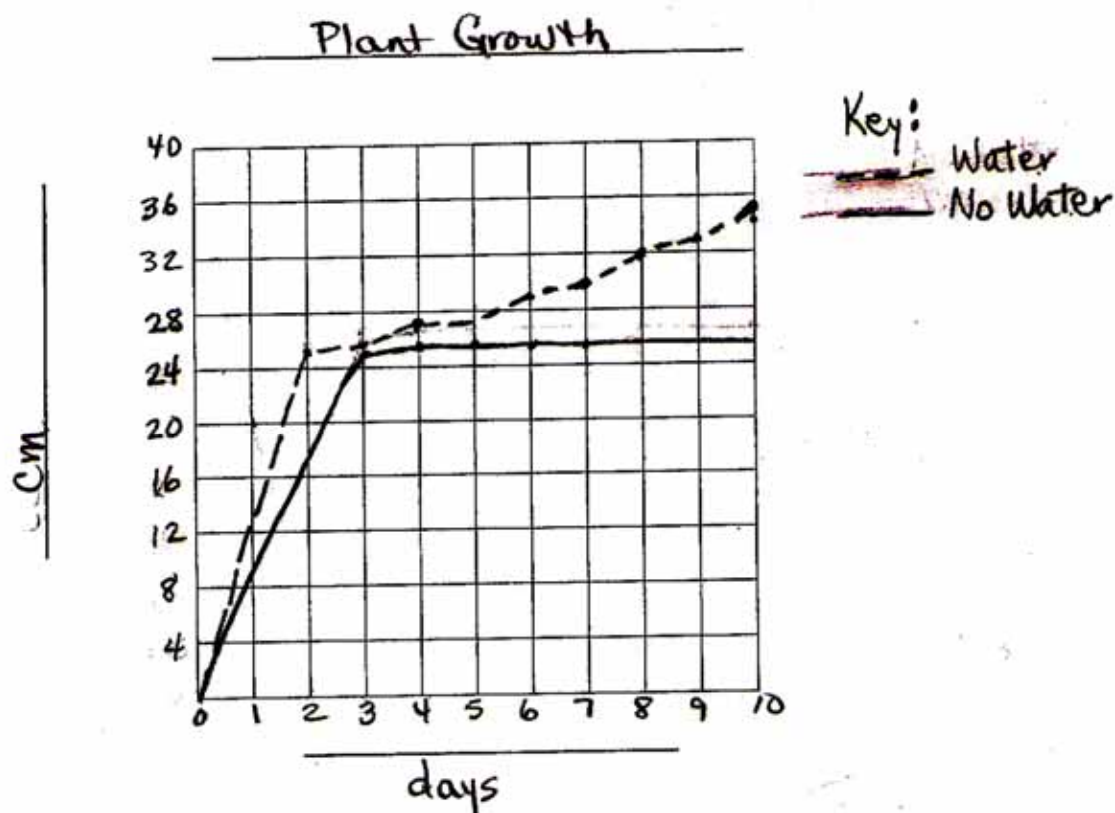
Graph is not plotted accurately due to inconsistent scaling of units)



**2 Points Earned**

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled

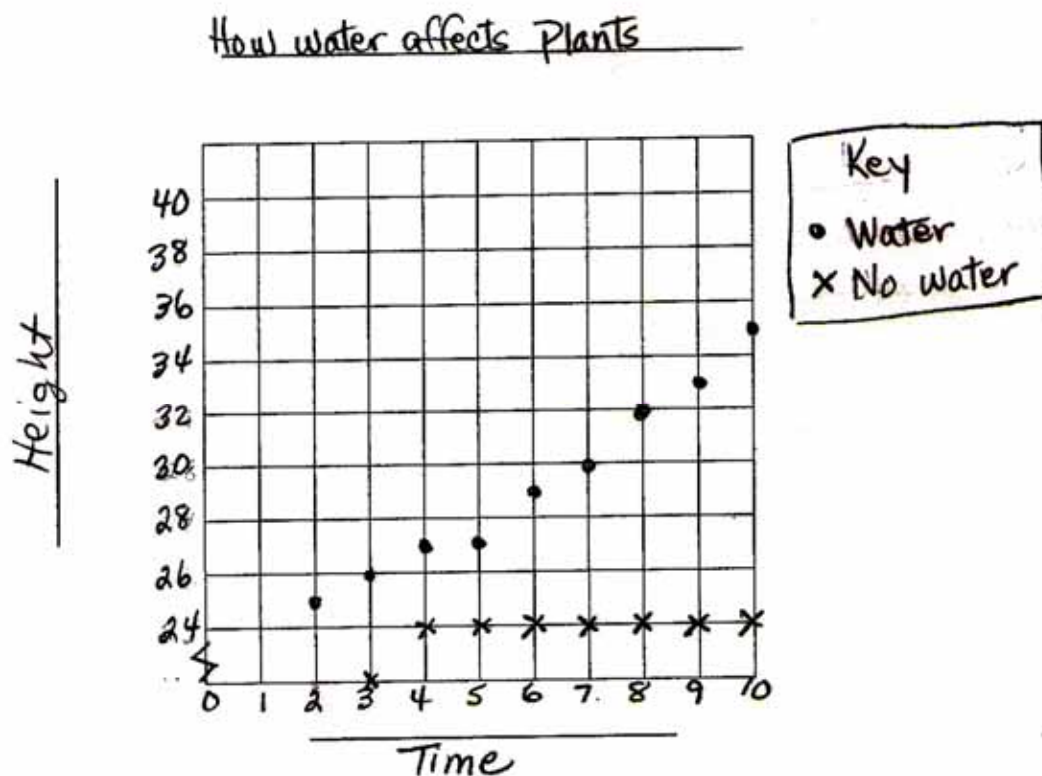
(Points are plotted incorrectly because line begins at zero height on day zero of the experiment, which is not correct – should be 25 cm according to scenario, No axes labels are provided)



**2 Points Earned**

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled

(Points not connected by a line, point values for “no water” plotted incorrectly)  
No units of measure are provided)

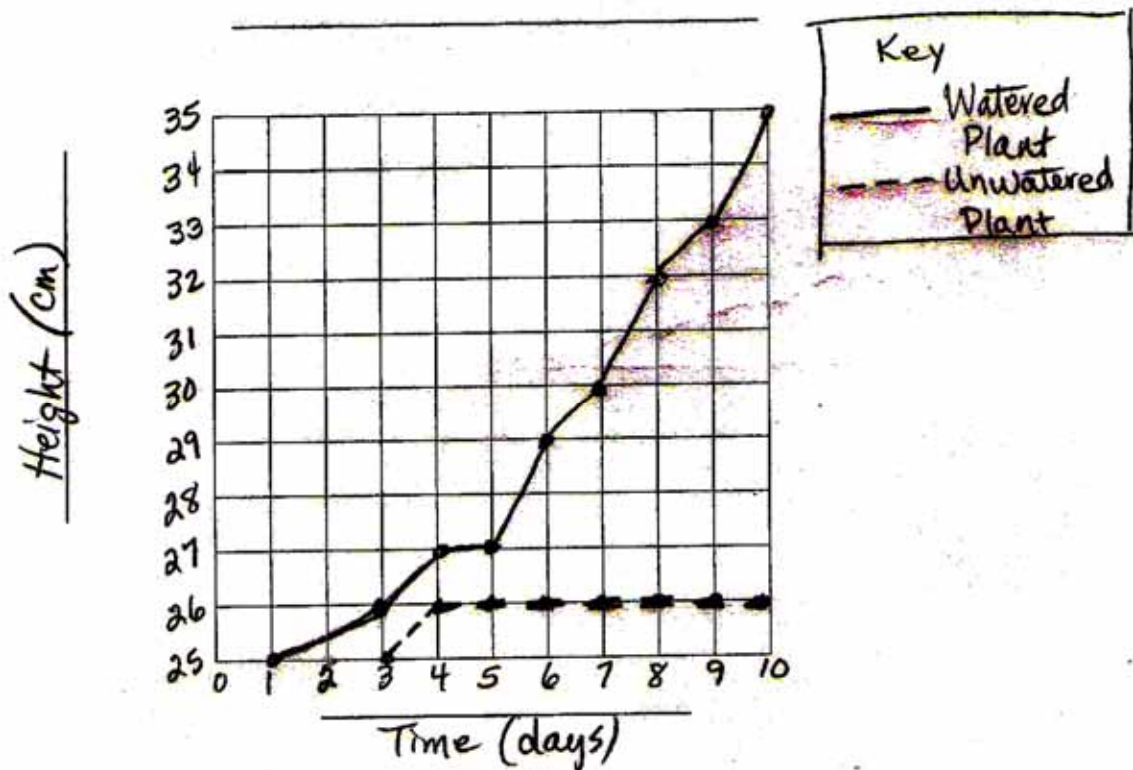


**2 Points Earned**

- Both axes correctly labeled (horizontal axis labeled with independent variable, vertical axis labeled with dependent variable), with units if appropriate
- Appropriate number scales labeled along each axis: numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled

(No title is provided,

Points are not plotted correctly – point 2,25 is plotted as 1, 25)



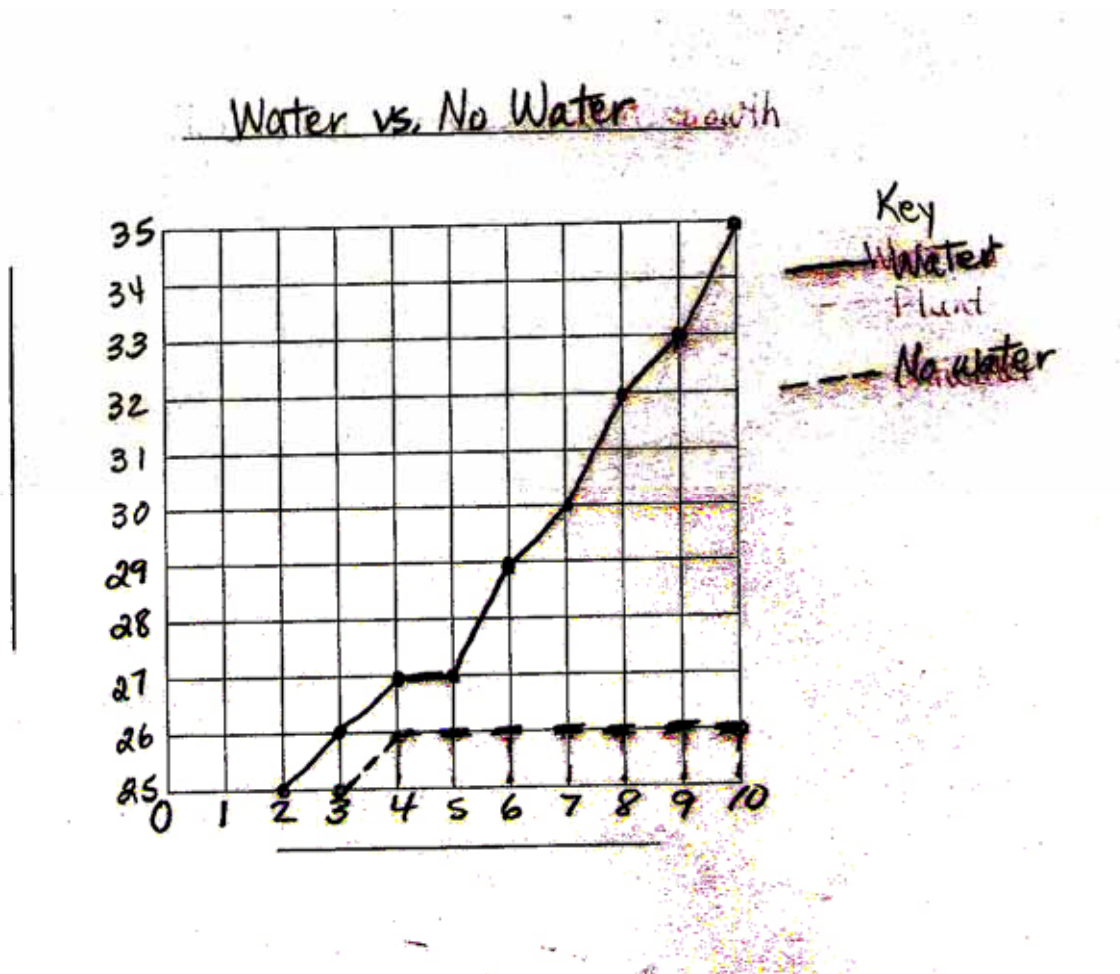


## 2 Points Earned

- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled
- **All data points correctly plotted and connected by lines AND with an appropriate key to identify each line**

(No axis labels are provided,

“Catching title” does not indicate that the investigation involves increase in plant height)

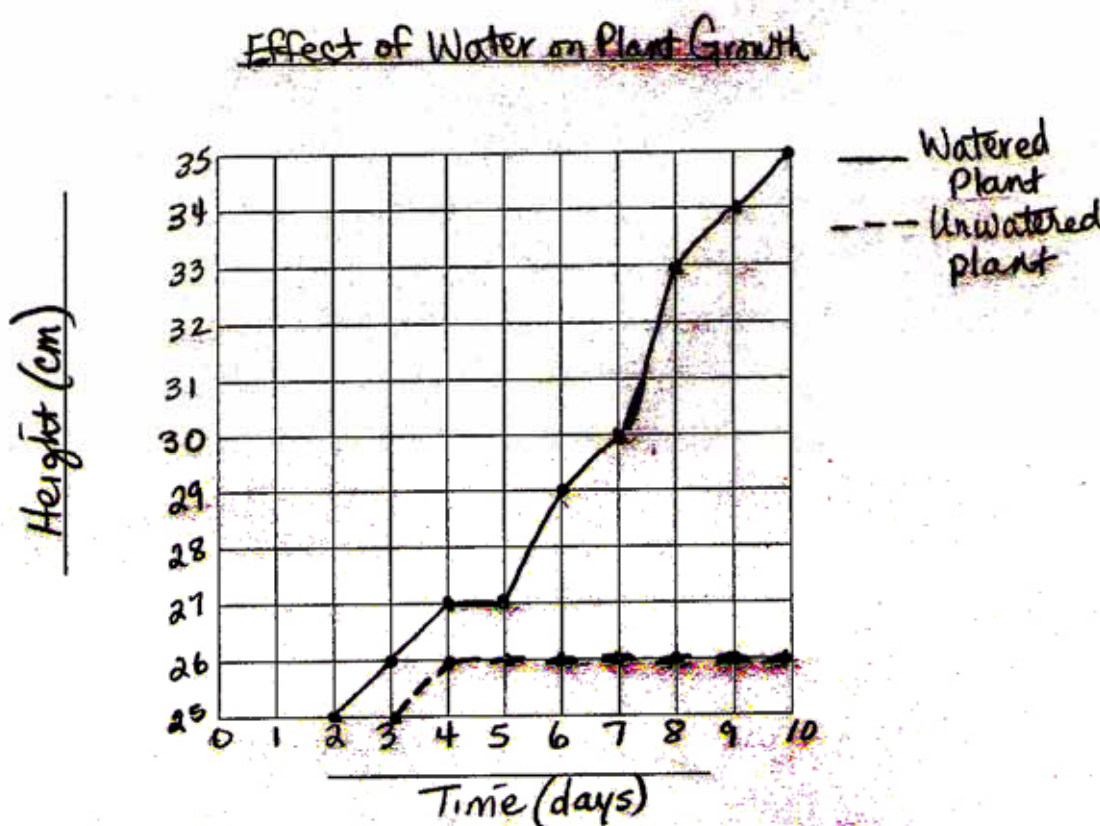




### 3 Points Earned

- **Appropriate title:** a statement of the relationship between the independent and dependent variables or a statement of what is being tested
- **Both axes correctly labeled (horizontal axis labeled with independent variable, vertical axis labeled with dependent variable), with units if appropriate**
- **Appropriate number scales labeled along each axis:** numbers written on the gridlines, numbers that allow all data to be plotted, consistently scaled

(numbers plotted incorrectly - point 8,32 is plotted as 8,33 & point 9,33 is plotted as 9, 34)



## Scenario B:

**Scientists must select one bacterium for production in large quantities for a local drug company as quickly as possible. They know that there are two new strains, A and B, of the bacteria. Bacteria can be grown using either starch or nutrient agar as a growth medium. However, only some bacteria digest the starch.**

**A. Write a question that could be the basis of their investigation**

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### **Anchor Responses for Testable Questions**

#### *Exemplary Testable Question/Statement of the Problem*

- Do bacteria A and B have different capacities for starch digestion?
- Which bacteria, A or B, will digest starch?
- Do bacteria A and B digest starch?

#### *Acceptable Testable Question/Statement of the Problem (more general)*

- Do bacteria digest starch?
- Bacteria are not all the same when it comes to starch digestion.
- Different bacteria have differing abilities to digest starch.

#### *Problematic Testable Question/Statement of the Problem (Not testable)*

- Have you ever observed bacteria digest food?
- Do bacteria enjoy digesting starch?

#### *Problematic: Not related to issue of differing digestive abilities of different bacteria*

- What kinds of media do microbiologists prefer?
- Is it better to change food for bacteria?

**B. What is the hypothesis for this investigation?**

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**Anchor Responses for Testable Hypotheses:**

***Exemplary Testable Hypothesis***

- If bacterium A is inoculated on starch agar plate, then it will digest starch and grow more colonies faster than bacterium B, or when grown on nutrient agar.

***Acceptable Testable Hypothesis***

- Bacteria A will grow on starch agar more than Bacteria B.
- Both A and B will grow the same number of colonies on both agars.

***Problematic Testable Hypothesis (Not testable)***

- Some bacteria digest starch because they like starch more than nutrient agar.

***Commentary (not hypothesis related to the issue of whether bacteria differ in their abilities to digest starch)***

- Lab technicians like to culture bacteria.
- Bacteria B will grow more than bacteria A.

***Vague/Incomplete***

- Bacteria A have been the most consistent.
- Bacteria B are better than Bacteria A.

***Not relevant to the test and not a hypothesis***

- How many lab technicians use bacteria A in their labs?

***Injects something other than what is being tested***

- Bacterium C digests starch the best. (Bacterium A and B are being tested, not C)
- I think more people will be cured by bacteria B.
- Bacteria B will grow faster at warmer temperatures than Bacteria A (temperature is not the variable being tested)

### III. Identifying and Controlling Variables

**C. Identify three factors that must be held constant during the experiment.**

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**Point Earned:**

***Exemplary Response:***

To determine if two different bacteria A and B have the capacity to digest starch; the variables to control would be (any of the three): incubation temperature, light, moisture, humidity, method of inoculation, amount of bacterium deposited onto the agar at inoculation, type of starch agar, time allocated for growth, observation intervals.

***Acceptable:***

Less precise answers rather than saying incubation temperature, light, or humidity, student will simply say temperature, light, moisture.

**No Points Earned:**

***Problematic:***

Identification of the independent variable or the dependent variable (numbers of colonies which develop or do not develop) as a control.

***Problematic:***

Identification of factors not related to the experiment such as state (Georgia, Missouri etc.) color, time of year, weather, viruses used, age or gender of lab technician conducting experiment.

**D. Construct a data table in the space below that other students could use to record and analyze the data collected during the new experiment related to growing colonies of bacteria. Be sure to label rows and columns appropriately and to include units if necessary.**

### **Anchors for Data Tables:**

#### **Point 1:**

The row or column headings indicate what information is to be manipulated and recorded relative to the independent variable (can be a descriptive heading with units, if necessary, or the conditions to be varied may be written in)

**AND**

The row or column headings indicate what information is to be observed and recorded relative to the dependent variable (can be a descriptive heading with units, if necessary, or the conditions to be varied may be written in)

**Point 2:** Data table is organized to allow for collection and analysis of data relevant to the experiment

### ***Exemplary: 2 Points Earned***

**Table 1 Results of Bacterial Digestion of Starch Experiment**

Bacterium	% of starch agar covered by bacteria colony growth	% of nutrient agar covered by bacteria colony growth	% of starch agar covered by bacteria colony growth	% of nutrient agar covered by bacteria colony growth	% of starch agar covered by bacteria colony growth	% of nutrient agar covered by bacteria colony growth	% of starch agar covered by bacteria colony growth	% of nutrient agar covered by bacteria colony growth	% of starch agar covered by bacteria colony growth	% of nutrient agar covered by bacteria colony growth
	Day 1	Day 1	Day 2	Day 2	Day 3	Day 3	Day 4	Day 4	Day 5	Day 5
<b>A</b>										
<b>B</b>										

**1 Point Earned:****Acceptable:**

- Title less precise but describes the essence of the experiment
- Row and column labels less precise but adequate for understanding of experimental results

**Table 1: Starch Digestion Results**

<b>Kind</b>	<b>Colonies starch 1st</b>	<b>Control colonies 1st</b>	<b>Colonies starch 2nd</b>	<b>Control colonies 2nd</b>	<b>Colonies starch 3rd</b>	<b>Control colonies 3rd</b>	<b>Colonies starch 4th</b>	<b>Control colonies 4th</b>	<b>Colonies starch 5th</b>	<b>Control colonies 5th</b>
<b>A</b>										
<b>B</b>										

**0 Points Earned:**

- Title of table does not address the fundamental question of the experiment
- Table not constructed to allow accurate records to be made and does not allow for valid analysis of results.
- No way to record the control group
- No way to show differences in growth across time.

**Table 1 Bacterium**

<b>Kind A/B</b>	<b>Growth</b>
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**0 Points Earned:**

- Table does not allow for recording of all data for the experiment, there is no way to record the results of Bacterium B
- Column Heading does not identify the independent variable (Kind of what? Unclear as to what A represents)

**Table 1 Starch Digestion Results**

<b>Kind</b>	<b>Colonies starch 1st</b>	<b>Control colonies 1st</b>	<b>Colonies starch 2nd</b>	<b>Control colonies 2nd</b>	<b>Colonies starch 3rd</b>	<b>Control colonies 3rd</b>	<b>Colonies starch 4th</b>	<b>Control colonies 4th</b>	<b>Colonies starch 5th</b>	<b>Control colonies 5th</b>
<b>A</b>										

**1 Point Earned:**

- Table does not allow for recording finding of the control groups.
- Column Heading does not identify the independent variable (kind of what? unclear as to what A and B represent)

**Table 1 Starch Digestion Results**

<b>Kind</b>	<b>Colonies Starch Day 1</b>	<b>Colonies Starch Day 2</b>	<b>Colonies Starch Day 3</b>	<b>Colonies Starch Day 4</b>	<b>Colonies Starch Day 5</b>
<b>A</b>					
<b>B</b>					

**0 Points Earned:**

- Table does not allow for multiple days of data.
- Column Heading does not identify the independent variable (kind of what? unclear as to what A and B represent)

<b>Kind</b>	<b>Colonies Starch</b>
<b>A</b>	
<b>B</b>	

**1 Point Earned:**

- Column Heading does not identify the independent variable (kind of what? unclear as to what A and B represent)

<b>Kind</b>	<b>Colonies starch 1st</b>	<b>Control colonies 1st</b>	<b>Colonies starch 2nd</b>	<b>Control colonies 2nd</b>	<b>Colonies starch 3rd</b>	<b>Control colonies 3rd</b>	<b>Colonies starch 4th</b>	<b>Control colonies 4th</b>	<b>Colonies starch 5th</b>	<b>Control colonies 5th</b>
<b>A</b>										
<b>B</b>										